REMARKS

Examiner is thanked for the Official Action of May 17, 2004. This request for reconsideration is intended to be fully responsive thereto.

CLAIM OBJECTIONS

Claims 4 and 5 were objected to because of informalities. Claim 4 was cancelled and the limitations were incorporated into claim 1. Claim 5 was canceled and the language of claim 5 was also incorporated into claim 1. Therefore, the amendments above satisfy the examiner's objections as to claims 4 and 5.

REJECTION UNDER 35 U.S.C. 112 FIRST PARAGRAPH

Claims 34 and 54 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

The Examiner states that the limitation in claim 34, "wherein at least one layer of electrode material is coated with an ion-conducting polymer" does not appear to be in the original disclosure. Therefore, Claim 34 has been amended to read "wherein electrode material is coated with an ion-conducting polymer" in conformance with the Examiner's recommendation.

Also, the limitation in claim 54, "wherein the amount of binder used in said first electrode layer is greater than the amount of binder used in said second electrode layer" does not appear to be in the original disclosure. Claim 54 has been amended to read "the percentage by weight of binder used in said electrode layer is greater than the percentage by weight of binder used in said second electrode layer". Therefore, the examiner is respectfully solicited to withdraw the rejection under the first paragraph of 35 U.S.C. 112.

REJECTION UNDER 35 U.S.C. 112 SECOND PARAGRAPH

Claims 1, 4-6, 34, and 54-56 were rejected under 35 U.S.C. 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter

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which applicant regards as the invention.

The limitation in claim 1, "thereby attaining effective adhesive properties and low electrical resistance of said electrode" is indefinite because the term "said electrodes" lacks antecedent basis within the claim. Claim 1 has been amended to recite "said first electrode layer" instead of "said electrode".

The limitation in claim 34, "at least one layer of electrode material" shows insufficient antecedent basis. As already discussed above, claim 34 has been amended to read "electrode material is coated with an ion-conducting polymer".

The limitation in claim 54, "wherein the amount of binder used in said first electrode layer is greater than the amount of binder used in said second electrode layer" is indefinite. As already discussed above, claim 54 has been amended to read "the percentage by weight of binder used in said electrode layer is greater than the percentage by weight of binder used in said second electrode layer".

Therefore, the examiner is respectfully solicited to withdraw the rejection under the second paragraph of 35 U.S.C. 112.

REJECTIONS UNDER 35 U.S.C. 102

Claims 1, 4, 34, 54 and 55 were rejected under 35 U.S.C. 102(b) as being anticipated by the JPO machine translation for JP 11-67214A to Osawa et al.

The examiner stated that Osawa et al. discloses the use of polyvinylidene fluoride to improve the adhesion of the first electrode layer to the current collector (see paragraph 7 of machine translation). Since polyvinylidene fluoride has a higher adhesive strength than polyaniline, the first electrode layer would have a stronger adhesive strength than the second electrode layer relative to the current collector resulting in an electrode structure having effective adhesive properties. Furthermore, the first electrode layer has low electrical resistance (see paragraph 9 of machine translation) and use of a conductive polymer as a binder in the second electrode layer would give low electrical resistance to the electrode structure.

In Osawa et al., paragraph 7 of the machine translation states that "...consists of

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a polyvinylidene fluoride...since the adhesion of a positive-electrode charge collector and an active material can be improved by using a fluorine system...as a binder..." However, polyvinylidene fluoride is known to be a less-adhesive material. For example, the present application explained that the binder polymer, that easily forms fibrils, binds poorly to the current-collecting material and as such has poor bonding strength and therefore such binder polymer is used in layers other than the first electrode layer.

It is a well-known fact in the industry that polyvinylidene fluoride is a less-adhesive material, and in order to show and prove this the applicant conducted experimentation and discloses the results herein and as appeared in the sworn statement attached hereto. In this experiment, a first electrode layer was formed by polyvinylidene fluoride while a second electrode layer was formed by Teflon.

The applicant used JIS 4.15 of D0202 where it states that a cellotape is placed and adhered on an object (e.g., electrode layer formed on a surface of the current collector); an end of the cellotape is picked up so as to make a right angle between an adhesive surface of the cellotape and the surface of the object; and the cellotape was peeled off instantly.

As shown in the two photocopies attached hereto, it is clear that the polyvinylidene fluoride of Osawa et al. shows less adhesiveness than that of the present invention as described in Sample 3 of the current specification (i.e., layers comprising of ion-conducting polymer first layer and Teflon second layer). The examiner is invited to view these photos and to compare them with FIG. 9 of the present invention. Two photos, i.e., (X) cellotape on which the peeled electrode is adhered and (Y) electrode after being peeled off, are similar to (C) in FIG. 9 of the present invention where the electrode layer has been completely peeled off from the current collector (rank "c"). See FIG. 9(C) and lines 5-7 of page 21.

This sworn statement clearly shows that polyvinylidene fluoride in fact tends to form fibrils and adheres poorly to the current collector and thus, has poor adhesive strength. Therefore, polyvinylidene fluoride is not a preferable material to be used on the first layer if employed in the present invention. A material that could easily fibril

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should and must be used on the second layer. This is a clear structural difference from Osawa et al and the present invention.

REJECTIONS UNDER 35 U.S.C. 102

Claims 5, 6, and 56 were rejected under 35 U.S.C. 102(b) as being anticipated by the JPO machine translation for Osawa et al. However, claims 5 and 6 were canceled by the above amendment and claim 56 is distinguished from Osawa et al. because of the above argument and reasoning.

CONCLUSION

Because of the structural differences between the present invention and the cited references, any rejection regarding claims 1, 6, 34, 54, and 56 are improper. Further, new claim 57 is dependent from claim 1 and therefore would be allowable if claim 1 is allowable. Therefore, it is respectfully submitted that claims, 1, 6, 34, 54, and 56-57 are now in condition for allowance and notice to that effect is respectfully requested.

Should the examiner believe further discussion regarding the above claim language would expedite prosecution they are invited to contact the undersigned at the number listed below.

Sincerely,

Tracy M Heims

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I hereby certify that on the date specified below, this correspondence is being facsimiled to the United States Patent and Trademark Office on July 16, 2004, to Box Non-Fee Amendment, Assistant Commissioner for Patents, Alexandria, VA 22313-1450

07/16/2004
Date

Tracy M. Heims

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
SATO et al.
Serial Number: 09/784,321 Group Art Unit: 1745
Filed: February 16, 2001 Examiner: Susy N. Tang Foster
Title: MULTI-LAYER ELECTRODE STRUCTURE AND MANUFACTURING SAME

****

DECLARATION OF INVENTOR REGARDING "ADHESIVITY"
OF MATERIALS KNOWN IN THE ART
UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 16, 2004

Sir:

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I, Takaya Sato, declare and state as follows:

1. I am a joint inventor of the above-identified patent application (the "subject application").
2. I am employed as chief scientist at Nisshinbo Industries Inc. of Tokyo, Japan ("Nisshinbo"). Since my graduation from Shinshuu University where I obtained a Master degree in Chemistry. I also obtained PhD. from Kyoto University in 1992. I have been so employed there for about 19 years. Including my employment with Nisshinbo, I have practiced as a chemist for 19 years, of which involved significant research, development and testing of electrochemistry and polymer field and some kinds of products in polymer and electrochemical device fields made with such technical experience. Through my experience, I have become well aware of the standards and terminology used in the battery and capacitor industry and have filed of polymer science domestic patent applications in the same field of art since the year of 19 and have had about 30 patents issued in Japan in the same field of art. I have also filed 10 United States applications in the same field of art since the year of 19 and have had 10 patents issued in the United States.
3. I have read and understand the subject application and the comments of the Examiner contained in the Office Action mailed 05/17/2004. The examiner stated that Osawa et al. discloses the use of polyvinylidene fluoride to improve the adhesion of the first electrode layer to the current collector (see paragraph 7 of machine translation). Since polyvinylidene fluoride has a higher adhesive strength than polyaniline, the first electrode layer would have a stronger adhesive strength than the second electrode layer relative to the current collector resulting in an electrode structure having effective adhesive properties. Furthermore, the first electrode layer has low electrical resistance (see paragraph 9 of machine translation) and use of a conductive polymer as a binder in the second electrode layer would give low electrical resistance to the electrode structure.
4. In Osawa et al., paragraph 7 of the machine translation states that "...consists of a polyvinylidene fluoride...since the adhesion of a positive-electrode charge collector and an active material can be improved by using a fluorine system...as a

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binder..." However, polyvinylidene fluoride is known to be a less-adhesive material. For example, the present application explained that the binder polymer, that easily forms fibrils, binds poorly to the current-collecting material and as such has poor bonding strength and therefore such binder polymer is used in layers other than the first electrode layer.

5. It is a well-known fact in the industry that polyvinylidene fluoride is a less-adhesive material and in order to show and prove this the applicant conducted experimentation and discloses the results herein. In this experiment (=Comparison 3), a first electrode layer was formed by polyvinylidene fluoride while a second electrode layer was formed by Tefron.
6. The applicant used JIS 4.15 of D0202 where it states that a cellotape is placed and adhered on an object (e.g., electrode layer formed on a surface of the current collector); an end of the cellotape is picked up so as to make a right angle between an adhesive surface of the cellotape and the surface of the object; and the cellotape was peeled off instantly.

7. EXPERIMENT

	Actual Electrode Composition (per weight)							
	Electrode layer	Electrolyte activated carbon	Powder conducting material (carbon black)	Binders			Electrode thickness	Solvent (per weight)
				Polymer Al	Teflon	PVdF		
Comparison 3	First	20	-	-	-	1	50	NMP(30)
	Second	20	-	-	0.5	-	230	NMP(34)

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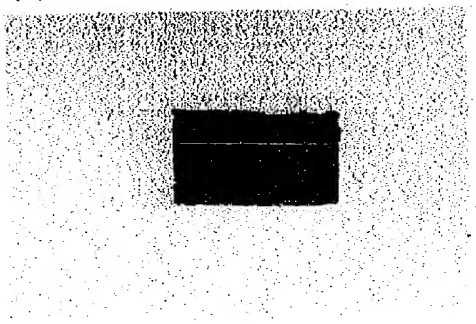
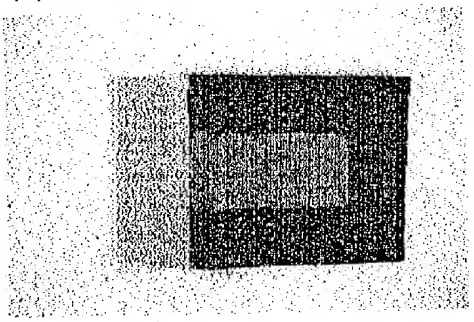
(X) Cellotape on Which the Peeled Electrode is Adhered



(Y) Electrode after being Peeled off



8. As shown in the two photocopies attached hereto, it is clear that the polyvinylidene fluoride of Osawa et al. shows less adhesiveness than that of the present invention as described in Sample 3 of the current specification (i.e., layers comprising of ion-conducting polymer first layer and Teflon second layer). The examiner is invited to view these photos and to compare them with FIG. 9 of the present invention. Two photos, i.e., (X) cellotape on which the peeled electrode is adhered and (Y) electrode after being peeled off, are similar to (C) in FIG. 9 of the present invention where the electrode layer has been completely peeled off from the current collector (rank "c"). See FIG. 9(C) and lines 5-7 of page 21.
9. In summary, this sworn statement clearly shows that polyvinylidene fluoride in fact tends to form fibrils and adheres poorly to the current collector and thus, has poor adhesive strength. Therefore, polyvinylidene fluoride is not a preferable material to be used on the first layer if employed in the present invention. A material that

could easily fibril should and must be used on the second layer. This is a clear structural difference from Osawa et al and the present invention.

10. Because of the structural differences between the present invention and the cited references, any rejection regarding claims 1, 6, 34, 54, and 56 are improper. Further, new claim 57 is dependent from claim 1 and therefore would be allowable if claim 1 is allowable. Therefore, it is respectfully submitted that claims, 1, 6, 34, 54, and 56-57 are now in condition for allowance and notice to that effect is respectfully requested.
11. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Takaya Sato — July 16, 2004 — Chiba JAPAN

Takaya Sato — Date — Place

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